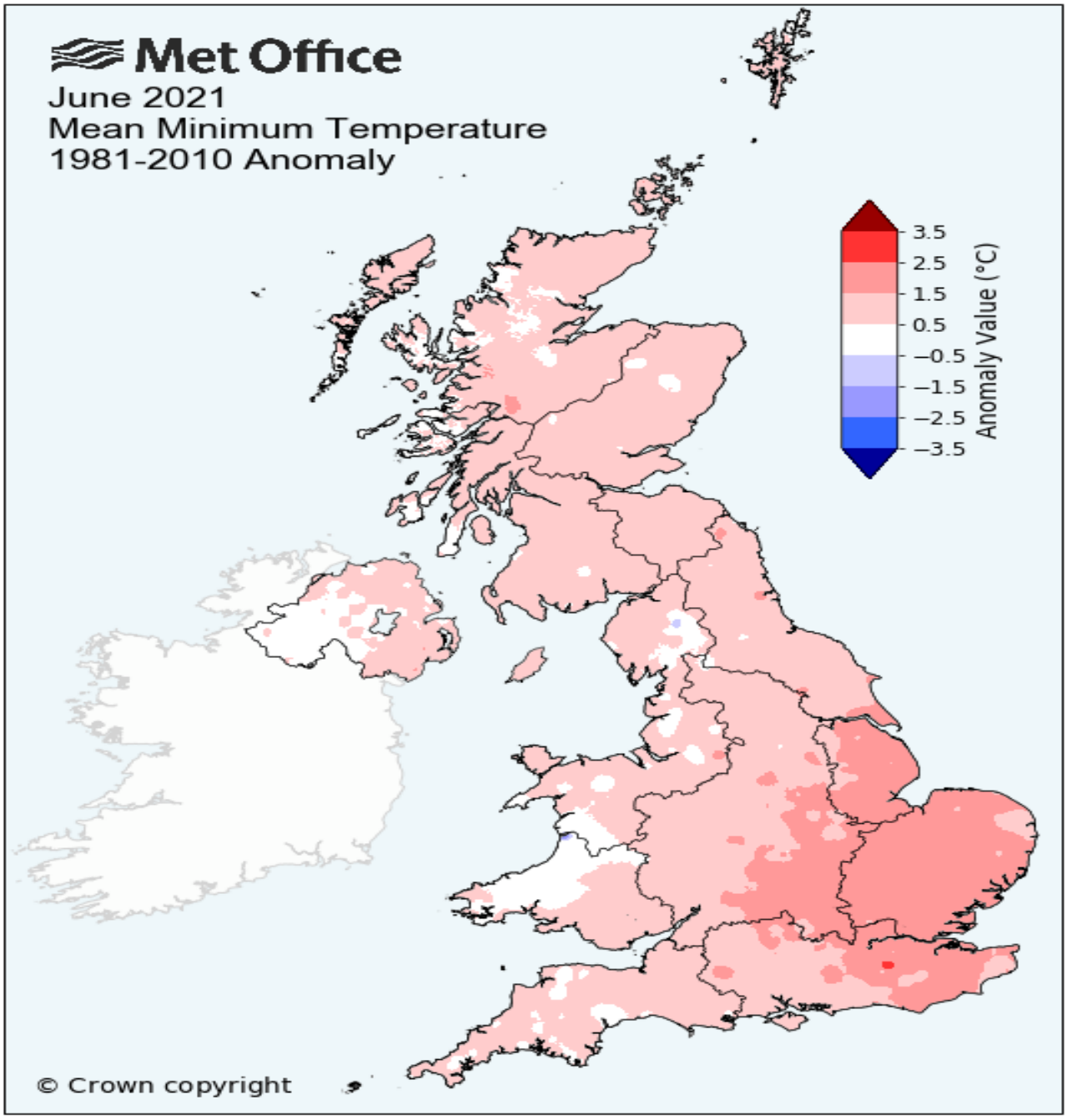
Warm June heralds start of summer, despite recent unsettled weather

Description

Summer has kicked off with a predominantly warm and sunny June compared to the long-term averages, according to provisional statistics from the Met Office.

Although conditions have been more unsettled for some in recent weeks, the UK has had above average temperatures for the month, including particularly warm nighttime temperatures with England reporting its joint second highest average minimum temperature in June since records began in 1884, with 10.7°C.

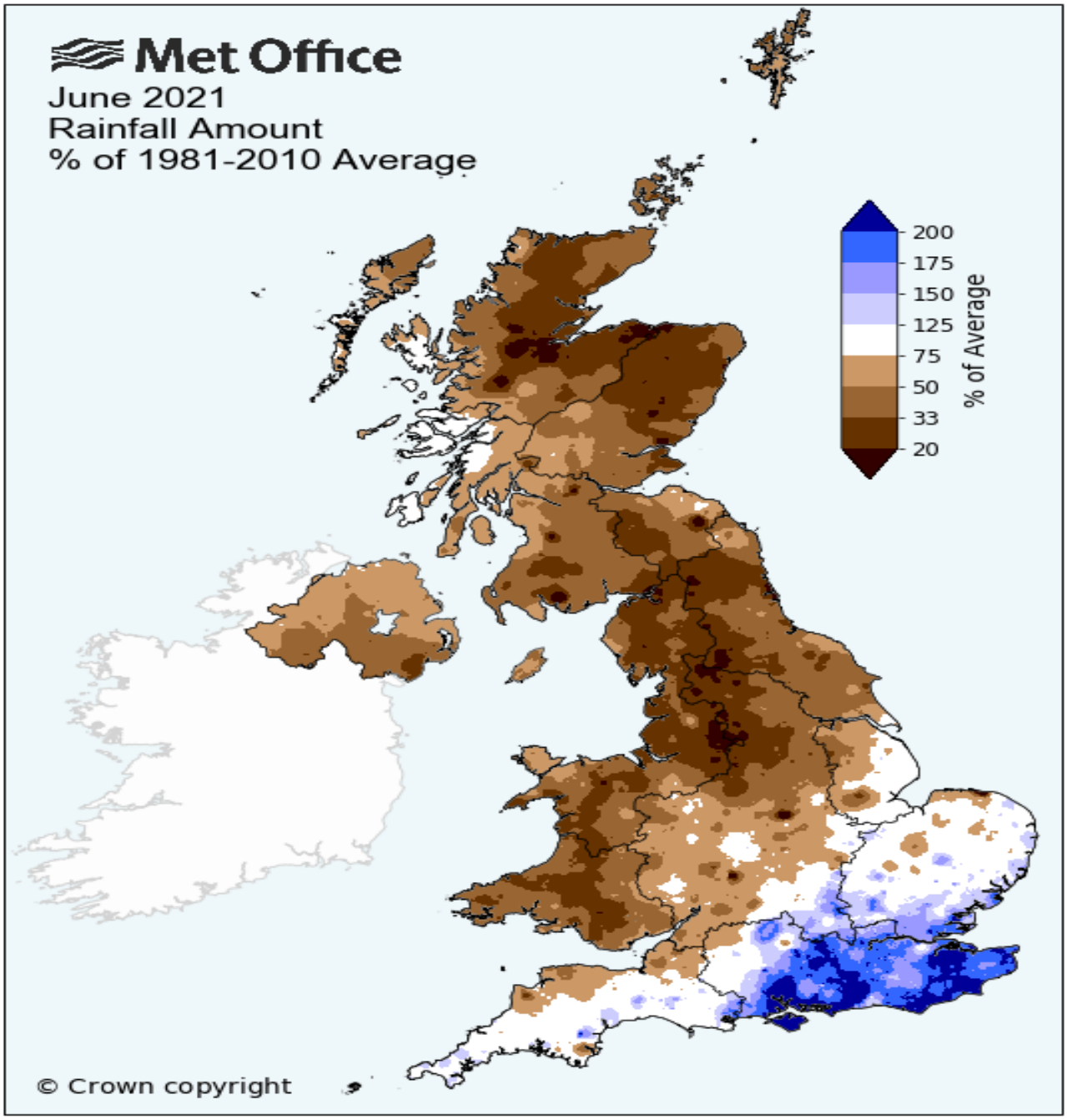


Map showing generally above average minimum temperatures across the UK

Although the high minimum temperatures are the most noteworthy, average maximum temperatures and mean temperatures were also more than one degree warmer than the long-term average for the UK, and each country in the UK is above the average for their temperature figures for the month. The warm conditions are in contrast to 2021's Spring, when cooler than average temperatures were reported as May concluded with showery and cold conditions.

The UK started to become more unsettled, and often stormy, from the middle of June. Southern areas, and particularly the southeast, have seen the heaviest rain, with London having double the amount of rain it would normally expect (97.1mm) and some locations in Hampshire and the Isle of Wight being

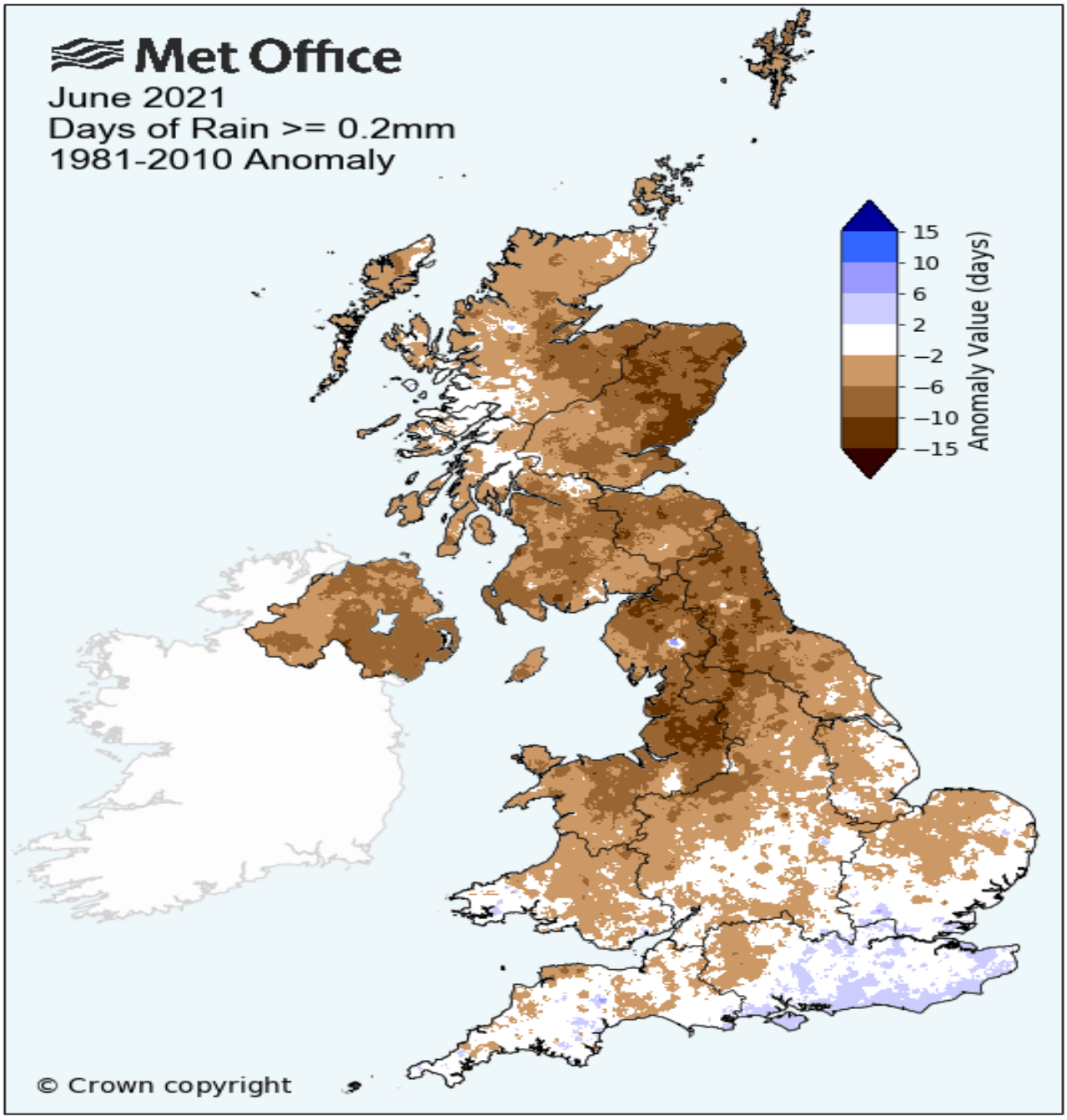
the wettest in the whole country with over three times their average June rainfall.



Map showing below average rainfall for large parts of central and northern areas of the UK and above average in areas of southern England, particularly the southeast.

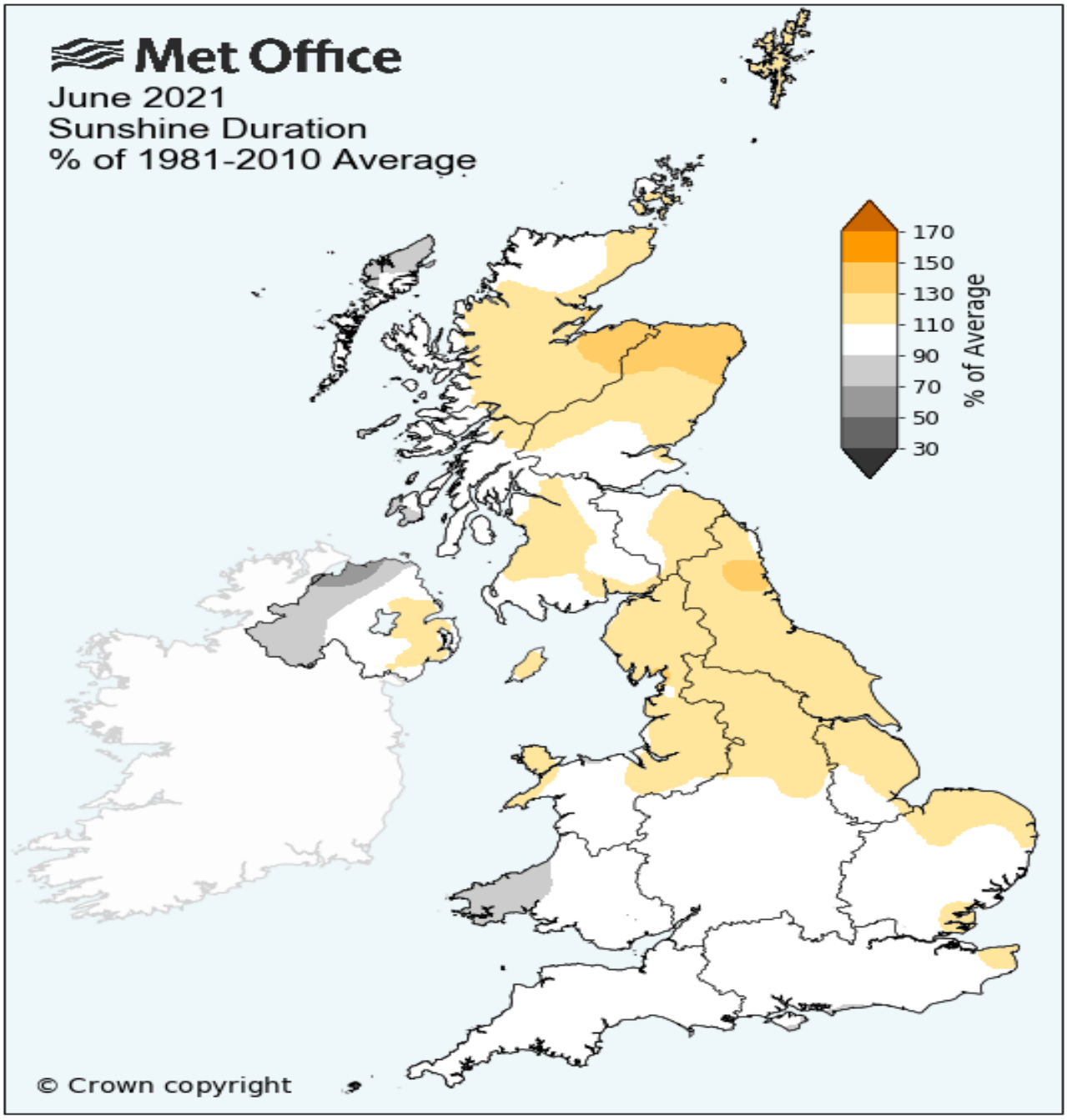
Those figures are in stark contrast to the northern reaches of the UK, with Scotland having just 44% (39.2mm) of its expected rainfall and Northern Ireland 52% (39.3mm). Wales has also seen below average rainfall, with just 37% (32.1mm) of the average rainfall for the month. England has had 77% (47.8mm) of its average rainfall, but that's largely accounted for by southern England seeing above average rainfall (105%, 59.4mm), while northern England had just 36% (25.7mm) of its expected rain.

Interestingly, despite southeast England seeing well above average rainfall, the number of days that it rained is actually fairly close to average, this is because the rainfall was heavy and persistent when it did make an appearance. Northern England, Wales and Scotland, however, had fewer days of rain than would be expected.



Map showing average number of days of rain in the UK

Hours of sunshine across the UK has been close to or above average for most regions, with a few duller areas in the west, with Northern Ireland being the only country not to quite reach its June average with 144.8 sunshine hours (96%).



Map showing around average sunshine for much of the UK, and slightly above average sunshine hours for central and northern areas

Dr Mark McCarthy, Scientific Manager of the National Climate Information Centre, said: “June has been warmer and sunnier than average for most of the country, with minimum temperatures being notably high as nights have remained fairly warm.

“High pressure was the dominant feature throughout the first part of the month, with temperatures regularly in the upper 20s and particularly warm in the southeast. However, there was a shift in the weather in the middle of the month for southern England which was regularly subject to outbreaks of heavy, and often thundery, rain. Northern England and Scotland, however, largely held on to warm,

sunny weather, albeit with showery rain threatening sometimes. Resulting in a sharp contrast in the rainfall statistics across the country.”

Provisional June 2021	Mean temp (°C)		Sunshine (hours)		Rainfall (mm)	
	Actual	Diff from avg (°C)	Actual	% of avg	Actual	% of avg
UK	14.2	1.2	181.9	107	43.2	59
England	15.3	1.3	195.0	107	47.8	77
Wales	14.1	1.0	174.1	100	32.1	37
Scotland	12.5	1.2	168.2	112	39.2	44
N Ireland	13.6	0.9	144.8	96	39.3	52

Date Created
July 2021

Tracking Extremes in a Changing Climate

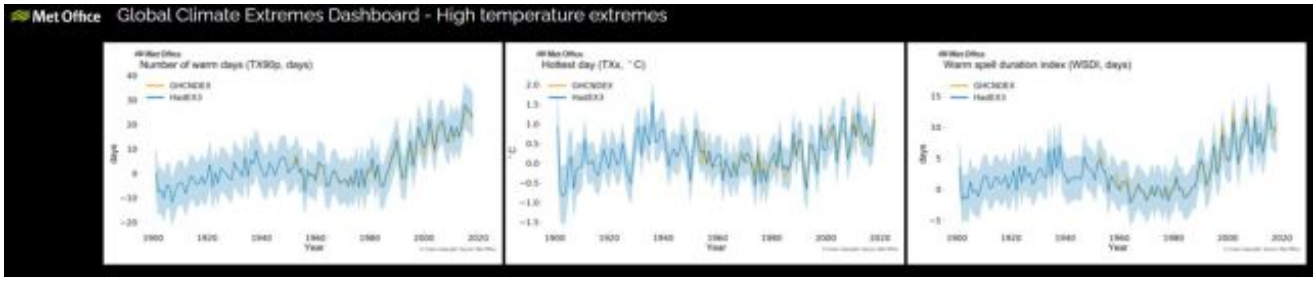
Description

It is often through extreme weather events, such as heatwaves and heavy rainfall, that the impacts from climate change first affect us, presenting the greatest shocks to our wellbeing, key infrastructure, the economy and our environment.

Scientists from the Met Office Hadley Centre have produced a dashboard monitoring key indicators of global climate extremes. These include changes in both high and low temperature extremes and changes in rainfall intensity extremes.

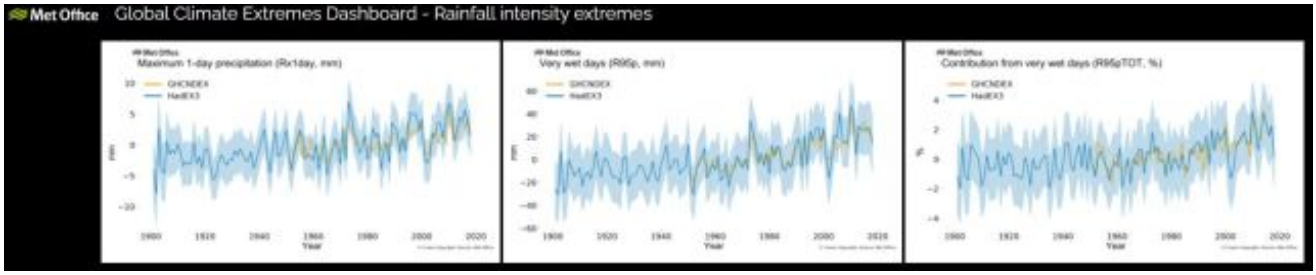
The dashboard is the result of a continuing project to present clearly and simply how climate change is affecting the planet. Using a dataset known as HadEX3, which provides historical observations of changes in temperature and precipitation extremes, it informs how the risk from extreme events has changed.

Indicators show that globally, the number of warm days has risen, with around an additional 20 “warm” days per year in the most recent decade when compared to the 1970s.



Met Office Hadley Centre global climate extremes dashboard showing high temperature extremes.

Three indicators in the dashboard monitor changes in intense rainfall globally – wettest day of the year, amount of rain falling in heavy events and the fraction of the total annual precipitation coming from heavy events. All indicators show gentle increases since the beginning of the 20th Century. On a global average, we see that on the wettest day in a year, a few more mm of rain will fall on average now than in similar events 100 years ago. Over 20mm more rain is falling on the wettest days of the year than the average over 1961-90. Nowadays, an extra 2% of the total annual rainfall is falling in these wet days, compared to 1961-90.



Met Office Hadley Centre global climate extremes dashboard showing rainfall intensity extremes.

These indices provide a different perspective on climate change, complementing other global indicators of change such as annual average temperature, CO_2 concentration and Arctic Sea ice extent, which the Met Office Hadley Centre reports in its climate dashboard to provide a more complete picture of what's happening in the climate. Dr Robert Dunn, Climate Scientist at the Met Office said: "As individual extreme and exceptional events capture the headlines, the observations in this dashboard show that across the globe extreme events are changing their character. For example, warm nights are becoming warmer, daily rainfall more intense, and warm spells are lasting longer. These give context to our recent, current and projected future climate."

These historical observations form part of mounting evidence which suggests that intense rainfall and heat extremes are becoming more frequent and intense in a warming climate. Nikos Christidis is a climate attribution scientist with the Met Office who looked at the record-breaking heatwave currently devastating parts of north western North America. He said: "Without human-induced climate change, it would have been almost impossible to hit such record-breaking mean June temperatures in the Western United States as the chances of natural occurrence is once every tens of thousands of years."

Last year, the prolonged Siberian heat where overall temperatures were more than 5°C above average from January to June 2020 is further evidence of the extreme temperatures we can expect to see more frequently around the world in a warming global climate. Met Office Climate Attribution scientist Andrew Ciavarella said that "climate change increased the chances of the prolonged heat in Siberia by at least 600 times."

Closer to home, October 2020 will be remembered for containing one of the wettest days on record for the UK with an exceptional average of 30mm of rain falling across the country in a single day. The record rainfall is estimated to have become about 2.5 times more likely because of human influence on the climate.

Monitoring extreme events is a key area of science and the new Met Office Hadley Centre climate programme will look at how global warming translates into local-scale changes in weather and climate extremes. Decision makers can use this information to inform adaptation and mitigation plans for future climate risk. At the COP26 climate conference in Glasgow later this year, a clear goal is agreeing adaptation measures to protect communities and natural habitats. Only the best climate science will enable us to build the resilience we need to face the challenges of the future.

HadEX3 was released last year and developed by the Met Office in collaboration with scientists from ARC Centre of Excellence for Climate Extremes at the University of New South Wales, Environment and Climate Change Canada and Barcelona Supercomputing Centre. We are continuing to develop our global climate extremes dashboard. Please get in touch if you have any feedback via email to knowledge.integration@metoffice.gov.uk

Date Created
July 2021

Get ready for tomorrow: Met Office launches climate newsletter

Description

The email newsletter is available for anyone with an interest in the latest climate change news and debates

The Met Office is launching a new Climate Newsletter to inform decision makers, scientists and the public about the very latest climate news and debates.

The twice-monthly email newsletter will bring together the latest research, news and developments on the environment and climate change and will share knowledge around the latest scientific thinking in the area.

The first issue shines a spotlight on extreme heat and the recent record-breaking temperatures across the northern hemisphere. Lytton, in southwestern Canada, broke the country's all-time maximum temperature record three days in a row.

In addition, the newsletter provides a one-stop-shop for the latest climate news, including information on the Climate Change Committee's publication of their Adaptation Committee's Independent Assessment of UK Climate Risk which set out priority climate changes risks and opportunities for the UK.

There's also a look ahead to what's coming up in climate news, including the Intergovernmental Panel on Climate Change being set to publish the first of three reports of its Sixth Assessment Report. 2020's State of the UK Climate will also be published in the coming weeks.

Also, with less than 100 days to go until COP26 in Glasgow, the newsletter shares details on the Government's publication of their COP26 Explained document, which highlights what needs to be achieved at the international climate negotiations and why.

In the foreword of the first edition of the newsletter, Director of the Met Office Hadley Centre Professor Albert Klein Tank noted, “Our climate is changing rapidly and will continue to change this century and beyond.

“Climate science is essential to help understand the challenges ahead and guide decisions to build the resilience we need to face the challenges of the future.

“As we approach the COP26 climate conference in Glasgow later this year, we will also share information on what the Met Office and others are doing ahead of these critical negotiations, including how research from our new climate science programme will address some of the key scientific challenges to inform the international climate gathering and beyond.”

You can sign up for the *Get ready for tomorrow* climate newsletter via GovDelivery.

Date Created
July 2021

Pole to pole on a tipping point journey

Description

There is one climate topic that you're likely to hear a lot about this year: tipping points.

In the context of climate science, a tipping point can occur when a relatively small change can have a large and irreversible effect on some of the Earth's largest systems, such as the Antarctic ice sheets or the Amazon rainforest.

In the first post in our series on tipping points, we looked at the definition of tipping points. In the second of our series we literally go from pole to pole to examine the potential for huge change in the oceans and the cryosphere – the Earth's wealth of ice.

Professor Tim Lenton – from the University of Exeter – is a world-renowned expert on tipping points. One tipping element (bits of the climate system that could pass a tipping point) that stands out as high risk for Professor Tim Lenton, is West Antarctica. Here there is physical evidence consistent with possibly having passed the tipping point for irreversible retreat of part of the ice sheet. Destabilization of the West Antarctica ice sheet could lead to about a three-metre sea-level-rise on a timescale of centuries to millennia. In a wider study Tim suggests that part of the East Antarctic ice sheet might similarly be unstable, with the potential to add another 3-4 m to sea level on timescales beyond a century.

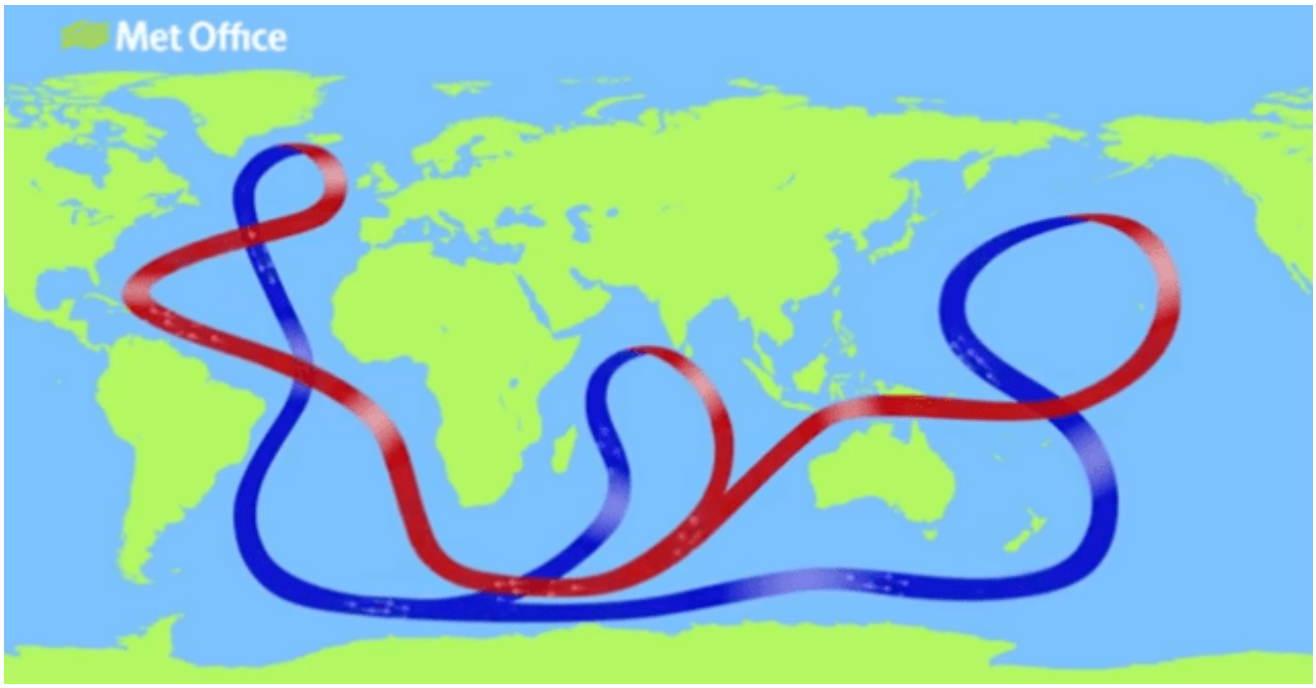
He said: "We might already have committed future generations to living with sea-level rises of around 10 m over thousands of years. But that timescale is still under our control. The rate of melting depends on the magnitude of warming above the tipping point. More observational data will establish whether ice sheets are reaching a tipping point, and better developed models are needed to resolve how soon and how fast the ice sheets could collapse." Tim.

Dr Ed Blockley, who leads the Polar Climate Group of the Met Office Hadley Centre, paints a similarly bleak picture for retreating Arctic sea ice. He explains that one challenge to understanding sea ice decline, is measuring the large seasonal and year-to-year variability against sustained long-term decline. However, over the past four decades, Arctic sea ice cover has reduced, on average, by 87,000 square kilometres, an area of more than four times the size of Wales each year. The Arctic has an important role to play in regulating climate, such as the albedo effect – where the expanses of white ice reflect the sun's energy back into space – and atmospheric circulation patterns, which can influence the weather at lower latitudes such as in Europe.

Dr Blockley said: "One potential tipping point of Arctic sea ice is the ocean halocline, whereby cold, fresh water at the surface is less dense than warm, salty water below and currently prevents the warm water from reaching the surface and melting the sea ice. If the halocline were to collapse, this warm water, which contains enough heat to melt all the sea ice many times over, could mean that the Arctic would remain ice-free even if global warming were to be reversed."

Tim Lenton added: "The Arctic is the place where a sort of cascade of unwelcome tipping point

changes may be starting because it's clearly the place that's warming up two to three times as fast as the global average. We are also accumulating more evidence of casual interactions here as well, such as the role of Arctic sea-ice retreat and resultant warming in permafrost thawing. We appear to be approaching several tipping points."



The global pattern of ocean circulation brings warm water into the North Atlantic and returns colder denser water southward. A global pump known as the Atlantic Meriodional Overturning Circulation.

Perhaps one tipping element more than any other attracts regular media headlines: the collapse of the Atlantic Meridional Overturning Circulation (AMOC). This huge conveyor belt brings warm salty water from the tropics into the northernmost reaches of the Atlantic. A weakening or collapse of this current could have devastating impacts on the climate of the northern Atlantic region, potentially switching off the transport of warm conditions to northern Europe.

Dr Richard Wood, head of cryosphere and oceans group at the Met Office Hadley Centre, explains: "If we were to add fresh water to the North Atlantic – such as from melting glaciers or increased precipitation run-off, for example – you would make the surface water fresher and less dense, weakening the 'pump' that drives the ocean circulation."

Warming of the surface waters due to greenhouse gases has a similar effect of making the surface waters less dense and so weakening the ocean circulation pump. So there is a 'double whammy' of warming and freshening conspiring to weaken the circulation.

Dr Wood added: "Because the AMOC is a circulation that spans the whole globe, it's a fundamental part of our climate system. We don't think a collapse is imminent in the next decade or so, but climate models do suggest that over the 21st century, the AMOC will weaken, as greenhouse gases increase. We need to monitor for any early warning signals that the AMOC is getting near a tipping point."

The Met Office’s second episode of our Mostly Climate podcast on Tipping Points can be found here.

Next time in the lasts of our tipping points series we’ll be travelling to the Amazon.

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July 2021

COP26 – 100 days to go

Description

COP – or Conference of Parties, is an annual United Nations climate summit where world leaders meet to discuss and make decisions on key global issues. In attendance will be countries that signed the United Nations Framework Convention on Climate Change (UNFCCC) back in 1994. This year sees the arrival of the much-awaited COP26, following postponement from November 2020 due to the COVID-19 pandemic. Every year a different nation takes on presidency of the summit, and this year's UK presidency, in partnership with Italy, will see the conference taking place in Glasgow from 31 October to 12 November 2021. There are just under 100 days to go until COP26 begins, so we'll be sharing lots of news in the coming weeks about our preparations here at the Met Office and how you can get involved.

COP26 is taking place in Glasgow later this year

This year's COP is the 26th annual summit and is of particular significance as it will mark 5 years since the signing of the Paris agreement at COP21 in 2015. The Paris
Agreement commits participating nations to the goal of limiting global warming to 2 degrees, preferably 1.5 degrees, above pre-industrial levels. Progress on the agreement will be reviewed every five years and updated plans laid out for the future, making this the first COP summit where progress is discussed amongst all committed nations. Following the declaration by the UK Government in 2020,

that this is a “year of climate action”, there is much anticipation as to what this year’s COP will deliver.

At COP25 back in 2019, many key issues remained without unanimous resolution. In light of this, as well as the ever-increasing threat of global warming, COP26 is considered to be an event of particular urgency, and one that experts hope will signify an acceleration of proactive global efforts to combat climate change. Over 190 world leaders are expected to attend the conference in Glasgow, where they will be joined by government representatives, businesses, non-profit organisations and citizens for 12 days of climate talks. Amongst the discussion points of the summit, there are some fundamental goals that the UK will strive to achieve. These include:

- securing global Net Zero emissions by the middle of the century and continuing to strive towards limiting global warming to a maximum of 1.5 degrees above pre-industrial levels;
- the deployment of adaptation measures to protect vulnerable communities and natural habitats from the impacts of climate change;
- the mobilisation of financial aid by developed countries to achieve global Net Zero; and
- acceleration of collaborations between governments, business and society in order to achieve ambitious climate goals.

Preparation is well and truly underway ahead of the conference in November, with a busy timeline of events aimed to further the UK’s progress towards delivery of its goals. More information on the pre-COP26 event schedule can be found on the COP26 website.

At the Met Office, we’ve also been busy with preparations ahead of the start of the summit in just under 100 days’ time. We’ve coordinated several COP related events, such as our Climate Science Conference in May, which brought together scientists, policy makers and communicators in a virtual conference to explore how climate science and services can create a more sustainable and resilient future. The event focused on a number of climate themes, with the goal of laying out a scientific agenda to inform climate policy during the COP26 event itself and until the end of the decade.

Met Office
UN CLIMATE CHANGE CONFERENCE UK 2021
We know that the climate has changed and we know it will continue to change over the next 30 years as we transition to net zero.
Professor Stephen Belcher, Chief Scientist
Climate Science Conference
11 & 12 May 2021
Science for a resilient future
Chief Scientist Stephen Belcher at the Climate Science Conference earlier this year

We've also made our own commitment towards the government's Net Zero pledge, with our own Journey to Net Zero by 2030. As part of this commitment, we will work towards achieving Net Zero emissions through all of our activities by investing in renewable energy solutions, reducing carbon emissions and engaging in carbon offsetting schemes to counterbalance any unavoidable outputs.

Much of our ongoing climate research informs government policy and is of particular relevance to the COP26 aims and ambitions. Our Hadley Centre Climate Programme undertakes research into climate change to determine the cause of such changes and develop services to manage climate risk.

Albert Klein Tank, scientific director of the Met Office Hadley Centre, one of the UK's leading climate research centres, discusses how Met Office research informs COP negotiations:

"At the Met Office, the run up to COP is perhaps even more important than the event itself, where our role is less visible. In the run up to COP, the Hadley Centre keeps the government informed on the latest science and information on climate projections. We will contribute to the latest IPCC report which will come out in August, which will also inform the international negotiations. It's really about aligning and making all of the latest evidence available so that the impacts and the local impacts of particular extreme events and how they can be attributed to climate change and to human interference is clear."

Some people have said that COP is a large gathering of people without much progress, but I feel much more optimistic. I think the fact that international communities and governments are coming together demonstrates that this really is at the top of their agenda, and with climate change growing and with the evidence of the impacts of climate change growing, this collaboration is really needed, and it is really timely."

For COP26 and future COP events, the Met Office will continue to collaborate with other research

organisations, governments and policy makers on the shared goal of tackling climate change and moving towards a resilient net zero future. By working with other organisations and communicating our findings to key audiences, we hope to strengthen the UK's position as a world leader in tackling climate change and as a key provider of robust global science. In doing this we will ensure our credibility as hosts of COP26 in November whilst also maintaining a legacy which extends into the coming decades, when a united global response to climate research will become increasingly urgent.

You can learn more about COP26 and how the Met Office is involved through the following links:

- https://www.metoffice.gov.uk/weather/climate/cop/what-is-cop
- https://www.metoffice.gov.uk/weather/climate/cop/cop26

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